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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/663,531

09/16/2003

Harry L. Tuller

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EXAMINER

RICHARDS, N DREW

ART UNIT

PAPER NUMBER

2815

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

01/05/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/663,531

Applicant(s)

TULLER ET AL.

Examiner

N. Drew Richards

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 01 November 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-13 and 16-18 is/are pending in the application.
- 4a) Of the above claim(s) 1-10 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 11-13 and 16-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/1/06 has been entered.

### ***Election/Restrictions***

2. Applicant's election without traverse of Group II, claims 11-20, in the reply filed on 10/27/04 is acknowledged.

### ***Product-by-Process Limitations***

3. While not objectionable, the Office reminds Applicant that "product by process" limitations in claims drawn to structure are directed to the product, per se, no matter how actually made. *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See also, *In re Brown*, 173 USPQ 685; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 161; *In re Wethheim*, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); *In re Marosi et al.*, 218 USPQ 289; and particularly *In re Thorpe*, 227 USPQ 964, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of

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the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or otherwise.

Note that applicant has the burden of proof in such cases, as the above case law makes clear. Thus, no patentable weight will be given to those process steps which do not add structural limitations to the final product.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –  
(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 11-13 and 16-18 are rejected under 35 U.S.C. 102(e) as being anticipated by Sano et al. (U.S. Patent No. 6,664,565 B1).

With regard to claim 11, Sano et al. disclose in figures 1-8 and on columns 1-10, for example, a wide band gap semiconductor device. Sano et al. disclose a device in figure 6 comprising:

a substrate 305/301;

a n-type ZnO layer 311 directly positioned on the substrate; and

a p-type ZnO layer 315 directly positioned on the n-type ZnO layer.

Since the ZnO layer 315 is a p-type layer is it an acceptor-doped material. With regards to the layers being annealed, being annealed under reducing conditions, and being annealed at intermediate temperatures under oxidizing condition between approximately 200-700 degrees C, these steps are product-by-process limitations that do not structurally distinguish over the prior art. The only necessary result of these product-by-process limitations is the p-type conductivity being activated. Though Sano et al. do not explicitly state that the impurities are activated, it is nonetheless implicitly understood that the impurities are activated as the device of Sano et al. operates by using the function of the p-type and n-type dopants in the materials. Thus, the structure of Sano et al. anticipates this claim.

With regard to claim 16, this claim is rejected similar to claim 11 above, but Sano et al. further disclose their device comprising a p-n junction.

With regards to claims 12, 13, 17 and 18, the limitations dealing with exposing to a hydrogen or non-hydrogen containing atmosphere are merely product-by-process limitations. These limitations are not considered to necessitate any further structure or to necessarily distinguish the structure claimed over the prior art. Sano et al. disclose the same final structure and thus anticipates the structure as claimed.

### ***Response to Arguments***

6. Applicant's arguments received 11/1/06 have been fully considered but they are not persuasive.

Applicant argues that Sano et al. does not describe an annealed p-type ZnO comprising an acceptor-doped material under reducing conditions. This is not persuasive. The recitation of the material being “annealed” and “under reducing conditions” is a product-by-process limitation that does not necessarily result in a structure different than that of Sano et al. Annealing and under reducing conditions are merely describing a part of the process used to form the layer. The final structure of a p-type ZnO layer with activated impurities is taught by Sano et al. and thus the claim is anticipated. It is noted that applicant has the burden of proving that their product-by-process limitations necessarily result in a different structure. In the instant case, no evidence or arguments have been presented that even allege to show that the product-by-process limitations recited result in a different structure than that of Sano et al.

Applicant further states that one of ordinary skill in the art would not consider an N-doped p-type ZnO layer to comprise acceptor-doped materials under reducing conditions. First, applicant’s reliance upon what one of ordinary skill in the art would or would not consider is unsupported by any facts or evidence on the record. Further, p-type is the common nomenclature in the art for acceptor-doped. Lastly, under reducing conditions is a product-by-process limitation that does not structurally distinguish over the prior art.

Applicant has also argued that Sano et al. teach the n-type layer being formed on a buffer layer and not on a substrate. This is not persuasive as the buffer layer 305 is considered part of the substrate. The term “substrate” is commonly used in the art to signify the layer, layers or structure upon which the object layer is formed. In this case,

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the object layer is n-type layer 311 and thus the layer or layers upon which it is formed (specifically 305 and 301) is considered the substrate.

Last, applicant has argued that Sano et al. does not teach the particular anneal at the claimed intermediate temperature under oxidizing conditions to activate the p-type conductivity. Again, this is a product-by-process limitation that does not structurally distinguish over the prior art.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to N. Drew Richards whose telephone number is (571) 272-1736. The examiner can normally be reached on Monday-Friday 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Parker can be reached on (571) 272-2298. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



N. DREW RICHARDS  
PRIMARY EXAMINER